

FORM PTO-1590 (REV 10-97)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		DATE: October 6, 2000	
		EXPRESS MAIL LABEL NO. EL496185211US	
		ATTORNEY DOCKET NO. 40551/DBP	
		U.S. APPLICATION NO. 097/847899	
INTERNATIONAL APPLICATION NO PCT/DE99/01082	INTERNATIONAL FILING DATE 6 April 1999	PRIORITY DATE CLAIMED 6 April 1998	
TITLE OF INVENTION SPINDLE OR WORM DRIVE FOR ADJUSTING DEVICES IN MOTOR VEHICLES			
APPLICANT(S) FOR DO/EO/US TAUBMANN, Werner; MACHT, Alwin; SCHRIMPL, Bernhard; and LIEBETRAU, Matthias			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1). <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)). <ol style="list-style-type: none"> <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). <input checked="" type="checkbox"/> has been transmitted by the International Bureau. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/LUS). <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)). <ol style="list-style-type: none"> <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). <input type="checkbox"/> have been transmitted by the International Bureau. <input type="checkbox"/> have not been made, however, the time limit for making such amendments has NOT expired <input type="checkbox"/> have not been made and will not be made. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)) (Unexecuted). <input checked="" type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 			
Items below concern other document(s) or other information included:			
<ol style="list-style-type: none"> <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <ul style="list-style-type: none"> <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. <input type="checkbox"/> A substitute specification. <input type="checkbox"/> A change of power of attorney and/or address letter. <input type="checkbox"/> Small entity claim with a copy of this transmittal letter attached. <input checked="" type="checkbox"/> International search report. <input checked="" type="checkbox"/> International preliminary examination report <input checked="" type="checkbox"/> Extra Set of Drawings <input checked="" type="checkbox"/> English Language Int. Appln. w/Annexes Incorporated <input type="checkbox"/> 			

09647899-11230

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U.S. APPLICATION NO. (If known, use 37 CFR 1.5) To be assigned: 097647899		INTERNATIONAL APPLICATION NO. PCT/DE99/01082		ATTORNEY DOCKET NO. 40551/DBP	
<input checked="" type="checkbox"/> The following fees are submitted: (see Note (1) below) Basic National Fee (37 CFR 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO..... \$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) ... \$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... \$1,000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT = \$ 860				CALCULATIONS PTO USE ONLY	
Surcharge of \$130 for furnishing the oath or declaration later than <input type="checkbox"/> 0 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 130	
Claims	Number Filed	Number Extra	Rate		
Total Claims	42+10 -20=	32	32X \$18	\$ 576	
Independent Claims	2 -3=	0	0X \$80	\$ 0	
Multiple dependent claim(s) (if applicable)			+ \$270	\$ 270	
TOTAL OF ABOVE CALCULATIONS =				\$ 1836	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$	
SUBTOTAL =				\$ 1836	
Processing fee of \$130 for furnishing the English translation later than <input type="checkbox"/> 0 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$ 1836	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
TOTAL FEES ENCLOSED =				\$ 1836	
Note (1): The basic national fee must be paid when filing this application. The 20-month time limit (37 CFR § 1.494) and 30-month time limit (37 CFR § 1.495) are not extendable.				Amount to be: refunded \$ charged \$	
a. <input checked="" type="checkbox"/> A check in the amount of \$ 1836.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-1728 . A duplicate copy of this sheet is enclosed.					
NOTE (2): Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO:					
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09/647899

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

EXPRESS MAIL NO. EL496185211US

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Applicant : Werner Taubmann, et al.
Filed : October 6, 2000
Title : SPINDLE OR WORM DRIVE FOR ADJUSTING DEVICES
IN MOTOR VEHICLES
Docket No. : 40551/DBP/M521

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Post Office Box 7068
Pasadena, CA 91109-7068
October 6, 2000

Commissioner:

Please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 2, line 12, of the English translation of the amended pages, delete "DE 30 07 107", and insert - DE 30 07 102 -.

IN THE CLAIMS:

Claim 2, line 1, delete "claim characterised", and insert --claim 1 characterised--.

Claim 6, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 12, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 13, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 14, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 15, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 16, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 19, line 1, delete "claims 16 to 18", and insert --claim 16--.

Claim 20, line 1, delete "claims 16 to 19", and insert --claim 16--.

Claim 21, line 1, delete "one of claims 16 to 20", and insert --claim 16--.

Claim 22, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 23, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 24, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 25, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 26, line 1, delete "one of the preceding claims", and insert --claim 1--.

Claim 27, line 2, delete "the preceding claims", and insert --claim 1--.

REMARKS

In view of the foregoing amendments, consideration and allowance of this application is respectfully requested.

Respectfully submitted,
CHRISTIE, PARKER & HALE, LLP

By *D. Bruce Prout*
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422 Rec'd PCT/PTO 06 OCT 2000

SPINDLE OR WORM DRIVE FOR ADJUSTING DEVICES IN
MOTOR VEHICLES

5 **Description**

The invention relates to a spindle or worm drive for adjusting devices in motor vehicles according to the preamble of claim 1.

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From DE OS 17 55 740 a spindle drive is known for an adjusting device on a motor vehicle seat. The vehicle seat is here fixed on two parallel slide rails which run on guide rails mounted on the vehicle floor. One threaded spindle is mounted parallel to each slide rail and is connected rotationally locked to same.

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Next to the locally fixed guide rails and fixedly connected to same is a gearing block which holds a spindle nut mounted on the threaded spindle, as well as a drive worm which meshes with the nut. The drive worms of each gearing block are connected to a common drive motor. The gearing block consists of two parts which are screwed together.

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If the drive motor is actuated then the spindle nuts are turned through the drive worms. Since the threaded spindle is mounted rotationally secured the threaded spindle and the vehicle seat connected to same are moved relative to the gearing block and thus to the vehicle floor.

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The drawback with this solution is that the gearing block is expensive to manufacture. The gearing block itself is too large so that it cannot for example be mounted inside the rails.

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From DE 40 21 669 A1 a housing is known for an electric auxiliary drive which has two half shells which are held together by means of elastic detent elements.

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From DE 43 24 913 C1 a housing is known for an electric servo drive which consists of a housing shell and a housing cover which on one side are connected together by elastic snap-fit elements and which on the other side are supported against each other through additional supporting areas.

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From DE 30 07 10²7 a device is known for changing the incline of the slats of a slatted blind, and has a rotatable drive shaft, a worm mounted on the drive shaft; a rotatable worm wheel engaging with the worm; an integral housing with two mirror-symmetrical shaped housing parts; a fixed articulated joint which connects the housing parts together so that they can be moved between an opening and a closing position; two bearing parts on each housing part which form a bearing for the drive shaft and the worm, as well as a bearing each as a support bearing for the worm wheel in the closed position of the housing parts; and a device which fixes the housing position secure in its closed position. This device comprises an L-shaped fastening yoke which is connected to the two housing parts by means of a locking bolt and two plug-type connectors. The plug-type connectors thereby

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serve to fix the housing parts in one plane and the locking bolt serves to fix them perpendicular to same.

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The object of the invention is to develop a gear housing for a spindle or worm drive for adjusting devices in motor vehicles which is cost-effective to manufacture and simple to fit. The gear housing should be small and compact and thus enable installation within the rails whilst at the same time it has to be ensured that in the event of the gear becoming blocked the vehicle seat can still be moved into a position which enables it to be dismantled.

15 This is achieved in that the gear elements are mounted in a gear housing which consists of at least two housing plates which are fixed against each other through plug-type connectors wherein the plug-type connectors serve at the same time as supporting connecting joints which absorb
20 the gear forces and to this end are designed correspondingly rigid. A gear element formed as a threaded spindle is thereby held according to claims 34 to 42 in at least one holder preferably by at least one ideal break point, and at least one end of the threaded spindle
25 is formed as a positive locking element which can be connected to a rotating tool in order to overcome the ideal break point for the purposes of emergency activation.

The advantage of the invention is that the size of the gear can be reduced significantly compared to similar gears since the plug-type connectors serving to fix the individual housing parts are at the same time also
5 suitable for taking up the gear forces. Thus the use of the gear according to the invention is also possible for motor vehicle seats where the actual seat is mounted on very narrow rails, and/or the possibility becomes available of changing over to narrow rail guides.

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In a preferred embodiment of the invention it is proposed to fix the position of the housing plates in relation to each other in all three-dimensional directions through the plug-type connectors. This fixing of the housing plates
15 can be produced for example by staking the material in the area of the plug-type connectors, by laser welding or by casting the plug-type connectors and by sticking the connectors. Further features on this can be derived from claims 27 to 33 which relate to a process for assembling
20 the gear housing.

Furthermore it is advantageous if the housing plates are fixed against each other solely at the said plug-type connectors. This produces with the minimum of expense a
25 supporting connection between the individual housing parts; it is not necessary to provide separate fastening means on one side and supporting areas on the other side which serve to absorb the gear forces.

30 The production of the gear is also possible using a small number of parts. Manufacturing costs are reduced since the housing parts and the tools can be manufactured cost-effectively. After assembling the housing it is not necessary to finish off the housing plates.

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The possibilities for use of the gear are wide. Particularly because of its size and low weight it can be

used for drives where the use of such gears was hitherto not possible.

The invention will now be explained in further detail with reference to the embodiments shown in the drawings in which:

- Figure 1 shows a perspective illustration of a spindle drive (showing one side of the bearing of the vehicle seat);
- Figure 2 shows a threaded spindle with gear including holder;
- Figure 3 shows a holder for a gear;
- Figure 4 shows an explosive view of the gear including holder;
- Figure 5 shows the gear in the assembled state;
- Figure 6 shows a housing plate with bearing bore for the drive worm;
- Figure 7 shows a housing plate with bearing bore for spindle nut;
- Figure 8 shows an L-shaped housing plate;
- Figure 9 shows a U-shaped housing plate in connection with a disc-like housing plate;
- Figure 10 shows the bearing of the threaded spindle with compressible threaded element as anti-rotation lock and for emergency operation;

- Figure 11 shows the bearing of the threaded spindle with compressible passage;
- 5 Figure 12 shows the bearing of the threaded spindle with a threaded element tensioned through a counter nut as the anti-rotation lock;
- 10 Figure 13 shows the bearing of the threaded spindle with a position-fixed nut which is tensioned on the threaded spindle through a counter nut;
- 15 Figure 14 shows the bearing of the threaded spindle with an anti-rotation lock of plastics;
- Figure 15 shows a sectional view of Figure 14;
- 20 Figure 16 shows an anti-rotation lock of the threaded spindle with a plastics lock;
- Figure 17 shows the anti-rotation lock of the threaded spindle through a welded pinch nut with distance sleeve;
- 25 Figure 18 shows the principle sketch of an adjusting drive with toothed rack; and
- Figure 19 shows a spindle drive for a window lifter.
- 30 As can be seen from Figure 1 a holding plate 1 is associated with a top rail 3. The holding plate 1 is provided with fastening brackets 11a, 11b for the drive motor 2 so that the drive motor 2 is fixedly connected with the holding plate 1 and thus fixed to the top rail 3.
- 35 The upper frame of the vehicle seat (not shown in further detail here) is fixed on the top rail 3.

Drive shafts 21 and 22 are mounted either side on the drive motor 2. Flexible shafts are preferably used here. These drive shafts 21, 22 produce the connection with a gear 9, the position, construction and functioning of which will be described in detail further on.

The top rail 3 slides directly or through displacement and/or bearing elements (not shown) on a bottom rail 4 which is fixed on the vehicle floor.

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In the functioning position of the top rail 3 and bottom rail 4 these rails are held by their contact and/or bearing areas so that a hollow cavity 31 is produced. A threaded spindle 5 is mounted inside this hollow cavity 31 where it is set between holders 6a and 6b which are mounted fixed on the bottom rail 4. The connection between the holders 6a, 6b is produced through fastening nuts 6c, 6d, 6c', 6d'.

20 The threaded spindle 5 interacts with the gear 9 which is likewise mounted in the hollow cavity 31 and positioned locally fixed in the top rail 3. This arrangement is shown in Figure 2. The gear 9 is held in a U-shaped holder 8 which is fixedly connected to the top rail 3 (not shown here). Uncoupling elements 10a, 10b are inserted between the arms 86a, 86b of the holders 8 and the gear 9 in order to eliminate any noises and compensate for tolerances.

30 In a further design of the bearing of the gear 9 it is provided in the top rail 3 through an extended holder 8'. This holder is shown in Figure 3. The gear 9 (not shown here) is mounted similar to the manner shown in Figure 2 in the gear mounting part 81 of the holder 8'. The arms 82a; 82b of the holder 8' are fixed on the top rail 3. In this embodiment these are screwed to the top rail 3. For this reason the arms 82a; 82b have fastening openings 83

which correspond to the fastening openings 30 in the top rail 3 shown in Figure 1. The fastening openings 83 are associated with welded nuts 84, that is the welded nuts 84 are welded onto the openings. The welded nuts 84 thereby point in the direction of the hollow cavity 31. Instead of the welded nuts 84 it is also possible to use unit nuts or stamped nuts. Another possibility is to create passages instead of using nuts, and to provide these with an internal thread. It is also possible to use combinations of the designs described above. Connecting or screwing the holder 8' to the top rail 3 improves its rigidity. Through the arrangement of the welded nuts 84 or passages mentioned above it is possible to assemble the gear 9 complete with its holder 8' in advance and then to slide this unit into the hollow cavity 31 of the rail guide 3; 4 which is already fitted. The top rail 3 can then be screwed to the holder 8' through the fastening openings 83.

20 The holders 8, 8' have in a further embodiment ideal deformation areas 87a; 87b which are arranged between the arms 86a; 86b of the gear holder 81 and the arms 82a; 82b of the holder 82a; 82b. These ideal deformation areas 87a; 87b can in the simplest design be correspondingly dimensioned welded seams. It is however also possible to use as ideal deformation areas 87a; 87b angles or other profiles at this point. All these elements are dimensioned so that they only yield when a predetermined ideal strain is applied and only then is the arm 86a; 86b or the gear socket 81 deformed. This then happens so that when a predetermined maximum boundary strain is exceeded the arms 86a; 86b swivel sideways and thereby clamp the threaded spindle 5. In the event of a crash this helps to provide additional security for the vehicle seat.

The two arms 82a, 82b of the holder 8' are angled and have in the angled areas 85a, 85b a wider material which substantially fills out the hollow cavity 31. The rigidity of the rail guide, i.e. its resistance to bending, can thereby be improved. The hooked engagement between the top rail 3 and bottom rail 4 remains secure.

Bores 88a, 88b provided in the arms 82a, 82b serve to centre the holder 8' relative to the top rail 3, for example through blind rivets (not shown here). The passages 89a, 89b formed in the arms 86a, 86b increase the critical cross-section of the retaining angle 8' and help to safely transfer forces in the event of a crash.

As can be seen from Figure 4, the gear 9 consists of a drive worm 91 which engages with a spindle nut 92 through the external worm gearing 92'. The drive worm 91 is connected to the drive motor 2 through the drive shaft 21, 22 (see here Figure 1). The spindle nut 92 is associated with the threaded spindle 5 through its internal thread.

Re the method of operation of the device: If the drive motor 2 rotates then it transfers its movement through the drive shaft 21, 22 to the drive worm 91. This transfers its rotary movement to the spindle nut 92. Since the threaded spindle 5 is secured against rotation the gear 9 and thus the top rail 3 connected to same, and including the vehicle seat, has to execute a translation movement (see here Figure 1).

Figure 4 shows an explosive view of the construction of the gear 9. It can be seen that the gear elements, consisting of a drive worm 91 and a spindle nut 92 are mounted in the housing plates 71a, 71b; 72a, 72b of a gear housing 7. Figure 5 shows the gear 9 in the assembled state. It can be seen that the drive worm 91 is mounted in the housing plate 71a and 71b through bearing bores 73a

and 73b whilst the spindle nut 92 is mounted in the bearing bores 74a and 74b of the housing plate 72a and 72b. Discs 95 and 96 are provided for the axial running of the spindle nut 92 and drive worm 91 whilst shaft discs 95', 96' serve to compensate for the axial play.

One possible construction of the gear housing 7 according to the invention can be seen from Figures 6, 7, 8 and 9. As can be seen from Figures 5 to 7 the gear housing here consists of two opposing disc-like housing plates 71a, 71b; 72a, 72b wherein the housing plates in the individual illustration according to Figures 6 and 7 are each provided with the reference numerals 71 and 72. The housing plates 71a; 71b; 72a; 72b are preferably made from a sintered material. They can however also be made from other materials, such as cast materials, steel or even plastics. The housing plates 71; 71b; 72a; 72b are manufactured to their final dimensions. This also relates to the bearing bores 73a; 73b; 74a; 74b, their position in the housing plates 71a; 71b; 72a; 72b and also their tolerances.

The opposing housing plates 71a; 71b and 72a; 72b which belong together are identical in design. Thereby one pair, in the embodiment here the housing plates 72a; 72b, have areas formed as webs 76 which are arranged on the edges of the housing plates 72a; 72b, thus extend along the plane of the housing plates 72a; 72b. The opposite sides 761; 761' of the webs 76 are aligned either parallel, run conical or have scraper ribs.

Corresponding recesses 75 formed as full-length through openings are arranged in the edge areas of the housing plates 71a; 71b transversely to the plane of the housing

plates 71a; 71b. These recesses 75 have surfaces 752; 752' parallel to the sides 761; 761' of the webs 76.

Other possible embodiments of the housing plates are shown in Figures 8 and 9. These are on the one hand two L-shaped housing plates 77a; 77b. These L-shaped housing plates 77a; 77b support on one of their arms webs 76' which correspond to the recesses 75' similar to the embodiment described above. The corresponding bearing bores 73' and 74' are as already described above, formed in the housing plates.

Figure 9 shows a gear housing which consists of a U-shaped housing plate 78 and a disc-like housing plate 79 associated therewith. The arms of the U-shaped housing plate 78 likewise support webs 76'' which engage in corresponding recesses 75'' of the disc like housing plate 79.

For assembly the webs 76; 76', 76'' are pushed into the recesses 75, 75', 75''. The dimensions of the recesses 75; 75'; 75'' and webs 76' 76'; 76'' are matched with each other so that after the assembly process either play fitments or press-fit fitments can be formed. After assembly the position of the recesses 75 and of the webs 76 and thus the position of the drive worm 91 relative to the spindle nut 92 are fixed and finally secured by plastically deforming the material in the area of the plug-type connections.

The fitting of the gear housing 7 can be assisted or completely replaced by automatic sequences. This will now be explained below with reference to disc-like housing plates 71a; 71b; 72a; 72b. The assembly of the L-shaped housing plates 77 and U-shaped housing plates 78 and 79 is carried out in a similar way. To this end the gear elements (drive worm 91, spindle nut 92; discs 95, 96;

shaft discs 95',96') including the housing (housing plates 71, 72) are all pre-assembled. This means that the gear elements are inserted in the bearing bores provided for this purpose and the housing plates 71, 72 are pushed
5 together.

This pre-assembled gear 9 is now inserted into a combined holding and staking device which holds the gear 9 around its outer contour. The hold is provided in the direction
10 of the plane of the housing plates 72a; 72b wherein the holding forces which engage on the four corners of the housing plate 71a or 71b are kept relatively small.

The gear 9 is now moved, preferably by turning the drive
15 worm 92. At least one revolution has to be made. The housing plates 71a; 71b; 72a; 72b can thus be aligned free of tension. After the completion of this movement the holding forces are intensified so that the gear elements 91, 92 and housing plates 71, 71b, 72a, 72b are held in
20 this position and are prevented from slipping. A staking tool now engages in the area of the plug-type connections, that is into the contact points between the webs 76; 76' and 76'' and the recesses 75; 75' and 75'' and then deforms the material plastically at these points. The
25 deformation is carried out so that the material forms undercut sections for example and thus finally fixes the position of the housing plates 71a; 71b; 72a; 72b relative to each other.

30 In order to prevent deformation of the bearing bores 74a; 74b of the spindle nut 92 the staking is not carried out over the entire length of the plug-type connections. Staking is only undertaken in the area where influence of the forces on the bearing area of the spindle nut 92 in
35 the housing plate 72 and thus deformation of the bearing bores 74 can be eliminated.

5 A further possibility lies in fixing the position of the housing plates 71, 72 relative to each other by casting the material in the area of the plug-type connections.

The bearing of the threaded spindle 5 can also be designed so that the holders 6a, 6b (see Figure 2) of the threaded 20 spring 5 are associated with vibration-damping sleeves (not shown here) or similar structural elements.

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One design of the invention consists in providing the bearing of the threaded spindle 5 with an emergency actuation. This is required to allow the threaded spindle 5 to be unturned in the event of a defect in the gear 9.

- 5 The vehicle seat can thereby also be moved in this case which is necessary if it is to be dismantled since the screw connection between the holder 6a; 6b and the bottom rail 4 can be concealed by the top rail 3. If it is necessary to undo the screw connection then the top rail 3
- 10 has to be moved relative to the bottom rail 4. For this it is proposed to provide the bearing of the threaded spindle on at least one holder 6a, 6b with an ideal break point and to provide the threaded spindle 5 at at least one end with a positive locking element 52 which can be
- 15 seized and turned by a tool when needed. Such designs are shown in Figures 10 to 17.

- Figure 10 shows a design where for example a threaded element 60 is used which has on its circumference a
- 20 weakened material area as a circumferential groove 61. However other types of weakened material areas are also possible, such as for example notches or the like. The threaded element 60 is welded to one of the holders 6a, 6b. In order to form an ideal break point the material is
- 25 squashed with the threaded spindle 5 in the area of the groove 61. This takes place at two opposite points of engagement (see arrows) whereby it is also possible to squash the material on one side only. In the event of an emergency operation threaded spindle 5 is turned and the
- 30 retaining force of the compressed material is overcome.

Welded, stamped or sheet metal nuts can be used as threaded elements 60, producing material or force-locking connections with the material.

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A simple variation is shown in Figure 11. Here instead of a threaded element 60 a passage 62 is produced in the

holder 6a, 6b and is provided with a thread to hold the threaded spindle 5. The passage 62 is compressed with the threaded spindle 5 (see arrows).

- 5 Figure 12 shows a solution wherein a threaded element 60' is welded to the holder 5a, 5b, similar to the variation illustrated in Figure 10. This threaded element 60' is tensioned by a counter nut 63. In the event of an emergency operation, the counter nut 63 can be loosened
10 and thus the threaded spindle 5 can be turned.

- Figure 13 shows a similar solution. A nut 64 is however here not welded to the holder 6a, 6b but is held in keyed connection through a stop 6e which is attached to the
15 holder 6a, 6b. The tension is likewise produced through a counter nut 63. As an ideal break point a welded point 60a is provided here between the nut 64 and the threaded spindle 5.

- 20 Figures 14 and 15 show a solution in which a security plate 65 is provided, having a bracket 65a which secures a nut 64' in its position arranged between the holder 6a and the security plate 65. As an ideal break point an anti-rotation lock 66, preferably made of plastics, is provided
25 here. This is inserted with its outer contour in keyed connection in a threaded spindle receiving bore 65b of the security plate 65. The keyed connection is here produced through at least one positive locking element 66a moulded on the circumference of the anti-rotation lock 66 and
30 corresponding to a matching recess 65c in the threaded spindle receiving bore 65b. The anti-rotation lock 66a is connected rotationally secured to the threaded spindle 5 in that a square edge or other geometrically designed element at the end of the threaded spindle 5 engages in a
35 corresponding internal contour 66b of the anti-rotation lock.

In the event of emergency operation the threaded spindle 5 including the anti-rotation lock 66 is turned which leads to the destruction of the anti-rotation lock 66. The threaded spindle 5 can thereby be moved.

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Figure 16 shows a different possibility of using the anti-rotation locking element of plastics. Here a plastics security member 67a is formed in a threaded spindle receiving opening of two holders 6a, 6b so that the circular round cross-section of the receiving opening 67 remains, whilst the width b of the plastics security member is however larger than the diameter d of the receiving opening 67. The compression and thus design of the ideal break point is through forces in the direction of the arrows. The possibility is thereby provided of the threaded spindle 5 transferring both tensile and compression forces whilst also being secured against rotation.

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20 In the event of emergency operation the plastics security member 67a is forced out so that the threaded spindle 5 can escape into the space which becomes available or, if necessary, can be forced into this space by means of a tool (not shown here). Thus the threaded spindle 5 becomes free and the vehicle seat can be removed without the threaded spindle 5 having to turn.

25

In Figure 17 a special pinch nut 68 is shown which similar to the example described with reference to Figure 10 is welded to a holder 6a, 6b and has a circumferential groove 61' as the weakened material area. The compression onto the threaded spindle 5 and the emergency operation take place similar to the example of Figure 10. In this example however a distance sleeve 69 is mounted on the special pinch nut 68 on the side remote from the holders 6a, 6b and restricts the travel path of the top rail 3 on the bottom rail 4. A variable end stop can for example

30

35

also be achieved through plastics clips (not shown here) which are fixed separately on the threaded spindle as the vehicle seat is fitted.

5 In order to be able to execute the emergency operation described above (with the exception of the example described in relation to Figure 16) in order to turn the threaded spindle 5 its end has to be gripped by a tool. For this purpose the end of the threaded spindle 5 has to
10 be provided with a suitably designed positive locking element 52. This can be achieved for example by flattening same on one or both sides or by providing an internal or external multi-edged shape, for example a square edge.

15 The use of the gear according to the invention described above is not only restricted to the operation of a threaded spindle 5. The use of a toothed rack is likewise possible. Figure 18 shows diagrammatically the
20 arrangement of a device of this kind which is mounted inside the gear housing 7 according to the invention. The drive worm 91' thereby meshes with a worm wheel 93 which is connected axially fixed to the worm 94. The worm 94 engages with the teeth of a toothed rack 51.

25 Through the rotary movement of the drive motor (not shown here) a rotary movement is transferred to the drive worm 91'. This moves the worm wheel 93 and thus the worm 94 which leads to a relative movement between the toothed
30 rack 51 and the gear. With this device it is likewise possible to operate a seat adjustment device or a window lifter or other adjustment devices in a motor vehicle.

Figure 19 shows a principle sketch from which it is
35 possible to see the use of the invention for driving a window lifter on a vehicle door. As can be seen from Figure 19 a window pane 12 is held between two guide rails

131, 132 which are arranged one on each side of the vehicle door. A window lifter motor 15 is mounted on the lower edge 12' of the window pane 12 through a holding rail 14 and is supplied with power through a cable. The drive shaft 23 of the window lifter motor 15 is connected to the gear 9. The construction of the gear 9 was already described in closer detail with reference to Figure 4. I.e. a drive worm (not shown here) is located inside the gear housing 7 and engages with that of a threaded spindle 5' through a spindle nut. The threaded spindle 5 is fixed rotationally secured on the inner door panel 15 through holding angles 161, 162. The axis of the threaded spindle 5 must thereby point in the direction of movement of the window pane 12.

15 If the window lifter motor 15 rotates then the spindle nut is turned through the drive worm (not shown here). Since the threaded spindle 5' is secured against rotation the fixed unit of gear 9, window lifter motor 15 and window pane 12 must move along the axis of the threaded spindle 5'. The window pane 12 is thereby guided in the guide rails 131, 132.

25 The use of the invention is not restricted to the examples described above for operating the longitudinal seat adjustment and window lifter drive. It is furthermore possible to use the invention for spindle or worm drives for adjusting the seat height, seat incline, seat cushion depth, seat back and or head restraint.

List of reference numerals

	1	Holding plate
	10a; 10b	Uncoupling element
5	11a; 11b	Fastening brackets
	12	Window pane
	12	Lower edge of window pane
	131; 132	Guide rails
	14	Holding rails
10	15	Window lifter motor
	151	Cable
	161; 162	Holding angle
	2	Drive motor
	21; 22	Drive shaft
15	24	Drive shaft
	3	Top rail
	30	Fastening opening
	31	Hollow cavity
	4	Bottom rail
20	5; 5'	Threaded spindle
	51	Toothed rack
	52	Positive locking element
	60; 60'	Threaded element
	60a	Welding point
25	61	Groove
	62	Passage
	63; 63'	Counter nut
	64; 64'	Nut
	65	Security plate
30	65a	Bracket
	65b	Threaded spindle receiving bore
	65c	Recess
	66	Rotational lock
	66a	Positive locking element
35	66b	Internal contour of anti-rotation lock
	67	Threaded spindle receiving opening
	67a	Plastics security member
	68	Special pinch nut
	6a; 6b	Holders
40	6c, 6d, 6c', 6d'	Fastening nuts
	6e	Stop
	7, 7'	Gear housing
	71a, 71b	Housing plates
	72a, 72b	Housing plates
45	73a, 73b	Bearing bores
	74a, 74b	Bearing bores
	75, 75', 75''	Recesses
	76, 76', 76''	Webs
	761, 762	Webs
50	77	L-shaped housing plate
	78	U-shaped housing plate
	79	Disc like housing plate
	8	Holder

	81	Gear socket	
	82a, 82b	Arm of holder	
	83	Fastening openings	
	84	Nut	
5	85	Angular areas	
	86a, 86b	Arm of gear socket	
	87a, 87b	Ideal deformation spots	
	9, 9'	Gear	
	91	Drive worm	
10	92	Spindle nut	
	92'	Worm wheel teeth	
	93	Worm wheel	
	94	Worm	
	95, 95', 96, 96'	Shaft ring	

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1. Spindle or worm drive for adjusting devices in motor vehicles, more particularly for seat adjusting devices, window lifters and sliding roofs, with a fixed spindle (5) or a fixed toothed rack (51) which is fixed on a first of two relatively displaceable parts, with a gear (9,9') which is mounted on the second of the relatively displaceable parts, and with a gear housing (7) for holding the gear, with the gear housing (7) consisting of at least two housing plates (71, 72, 71a, 71b, 72a, 72b, 77a, 77b, 78, 79) which can be fixed against each other by means of plug-type connectors, characterised in that the position of the housing plates (71, 72, 71a, 71b, 72a, 72b, 77a, 77b, 78, 79) is fixed relative to each other in all three-dimensional directions by means of the plug-type connectors and that the plug-type connectors are formed at the same time as supporting connecting joints which absorb the gear forces.
2. Drive according to claim characterised in that the housing plates (71, 72, 71a, 71b, 72a, 72b, 77a, 77b, 78, 79) are fixed against each other solely at the plug-type connections.
3. Drive according to claim 1 or 2 characterised in that the gear housing (7) consists of two L-shaped housing plates (77a, 77b).

4. Drive according to claim 1 or 2 characterised in that the gear housing (7) consist of at least two pairs of
5 opposing disc-like housing plates (71a, 71b, 72a 72b) wherein the housing plates (71a, 71b, 72a, 72b) which are arranged in pairs are preferably identical in design.
- 10 5. Drive according to claim 1 or 2 characterised in that the gear housing (7) consists of a U-shaped (78) and a disc like housing plate (79).

pairs of opposing disc-like housing plates (71a, 71b, 72a, 72b) wherein the housing plates (71a, 71b, 72a, 72b) which are arranged in pairs are preferably identical in design.

5

5. Drive according to one of claims 1 to 3 **characterised in that** the gear housing (7) consists of a U-shaped (78) and a disc-like housing plate (79).

10

6. Drive according to one of the preceding claims **characterised in that** the raised areas (76, 76', 76'') of the plug-type connections extend along the plane of the housing plates (72, 72a, 72b, 77, 78) and the associated
15 recesses (75, 75', 75'') extend transversely to the plane of the housing plates (72, 72a, 72b, 77, 78).

20

7. Drive according to claim 6 **characterised in that** the recesses are formed as through openings (75, 75', 75'').

25

8. Drive according to claim 6 **characterised in that** the raised areas are formed as webs (76, 76', 76'').

30

9. Drive according to one of claims 6 to 8 **characterised in that** the raised areas (76, 76', 76'') of the plug-type connectors have in the assembly direction parallel surfaces (761, 762, 761', 762') associated with matching
30 recesses (75, 75', 75'') with surfaces (751, 752, 751', 752') which are likewise parallel in the assembly direction.

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10. Drive according to one of claims 6 to 8 **characterised in that** the raised areas (76, 76', 76'') of the plug-type connectors have surfaces running conical in the assembly direction and associated with recesses (75, 75', 75'')
- 5 having surfaces (751, 752) which where necessary are parallel in the assembly direction so that during assembly a press fit is achieved.
- 10 11. Drive according to one of claims 6 to 8 **characterised in that** the raised areas (76, 76', 76'') of the plug-type connectors form at first a play fit with the recesses (75, 75', 75'') and that the fixing of the housing plates (72a, 72b, 77, 78) is achieved by plastic deformation of the
- 15 material in the area of the plug-type connectors.
12. Drive according to one of the preceding claims **characterised in that** the housing plates (72a, 72b, 77,
- 20 78) are made from sintered material, cast material, steel or plastics.
13. Drive according to one of the preceding claims
- 25 **characterised in that** at least a part of the bearing points (73, 73a, 73b, 74, 74', 74'', 74a, 74b) of the gear elements (91, 91', 92, 93, 94) are integrated in the housing plates (72a, 72b, 77, 78).
- 30 14. Drive according to one of the preceding claims **characterised in that** the gear (9) consists of a threaded spindle (5), a spindle nut (92) with an external worm wheel teeth (92) and a drive worm (91) engaging therewith.

15. Drive according to one of the preceding claims **characterised in that** the gear (9) comprises a toothed rack (51), a worm (94) with a worm wheel (93) associated therewith and a drive worm (91') wherein the worm (94) lies on an axis with the worm wheel (93) and is fixedly connected to same.
- 10 16. Drive according to one of the preceding claims **characterised in that** the threaded spindle (5) is mounted in the hollow cavity (31) of a box-profile type guide rail (3, 4) of a longitudinal seat adjustment device wherein the threaded spindle (5) is fixed through its ends on the
15 bottom rail (4) which is fixed on the vehicle whilst the gear housing (7) is fixed on the top rail (3) which is displaceable relative thereto.
- 20 17. Drive according to claim 16 **characterised in that** the gear housing (7) is mounted in a U-shaped gear socket (81) of a holder (8) whose arms (82a, 82b) are provided for fixing the gear (9) on the top rail (3).
- 25 18. Drive according to claim 16 and 17 **characterised in that** the arms (82a, 82b) of the holder (8) extend over the entire length of the top rail (3) and support fastening openings (83) associated with the fastening openings (30)
30 of the top rail (3) so that the holder (8) can be connected to the top rail (3) and reinforces same.
- 35 19. Drive according to claims 16 to 18 **characterised in that** the fastening openings (83) of the holder (8') are

formed as fastening elements (84) with internal threads, preferably in the form of passages, which project into the hollow cavity (31).

5

20. Drive according to claims 16 to 19 **characterised in**
that the gear (9) is pre-assembled as a complete unit and,
installed in the holder (8'), can be pushed into the
hollow cavity (31) of the rail guide (3, 4) where it can
10 be screwed to the top rail (3) through the fastening
openings (83).

21. Drive according to one of claims 16 to 20
15 **characterised in that** the end areas (85a, 85b) of the
holder (8') are angled and designed so that they
substantially fill out the free cross-sectional area of
the top rail (3) and/or the bottom rail (4).

20

22. Drive according to one of the preceding claims characterised in that uncoupling elements (10a, 10b) of rubber or plastics are mounted to eliminate noise and compensate for tolerances between the gear (9) and the arms (86a, 86b) of the gear socket (81) of the holder (8).

23. Drive according to one of the preceding claims
characterised in that ideal deformation points (87a, 87b)
30 are formed between the arms (86a, 86b) of the gear socket
(81) and the arms (82a, 82b) of the holder (8') so that
when a predetermined maximum boundary strain is exceeded
the arms (86a, 86b) swivel sideways and clamp the threaded
spindle (5).

35

24. Drive according to one of the preceding claims characterised in that the ends of the threaded spindle (5) are mounted in vibration-damping sleeves or the like to eliminate noise.

5

25. Drive according to one of the preceding claims characterised in that for a window lifter the threaded spindle (5') is fixed in the vehicle door so that the threaded spindle (5') points in the direction of movement of the window pane (12) and that the gear which is connected to the threaded spindle (5') is connected directly or indirectly to the lower edge (12) of the window pane (12).

15

26. Drive according to one of the preceding claims, characterised in that the spindle or worm drive is a constituent part of an adjustment device for adjusting the seat height, seat incline, seat cushion depth, head restraint and/or backrest.

~~27. Method for assembling a gear housing for a spindle or worm drive according to the preceding claims, characterised in that the gear elements (91, 92, 93, 94) and housing plates (72a, 72b, 77, 78) are prefitted complete and inserted into a device which holds the housing (7) with slight holding forces around the outer contour, that the gear elements (91, 92, 93, 94) are turned for the purpose of aligning the bearing points (73a, 73, 74a, 74b) and that after alignment by increasing the holding forces the position of the gear elements (91, 92, 93, 94) and housing plates (72a, 72b, 77, 78) relative to each other is fixed and finally their position is secured.~~

35

27. Method for assembling a gear housing for a spindle or worm drive according to one of the preceding claims in which

a) the gear elements (91, 92, 93, 94) and housing plates (72a, 72b, 77, 78) are prefitted completed wherein the housing plates (72a; 72b; 77, 78) are fitted together and the plug-type connections are formed as supporting connecting joints absorbing the gear forces,

b) the gear elements (91, 92, 93, 94) and housing plates (72a, 72b, 77, 78) are inserted into a device which holds the housing (7) with sufficiently light holding forces around the outer contour so that that the housing plates (72a, 72b, 77, 78) can be aligned when the gear elements (91, 92, 93, 94) are turned,

c) the gear elements (91, 92, 93, 94) are turned for the purpose of aligning the bearing points (73a, 73, 74a, 74b) of the gear elements which are provided on the housing plates (72a, 72b, 77, 78),

d) and that after alignment by increasing the holding forces the position of the gear elements (91, 92, 93, 94) and housing plates (72a, 72b, 77, 78) relative to each other is secured and the position of the housing plates is permanently fixed in all three-dimensional directions through action on the plug-type connectors.

28. Method for assembling a gear housing for the spindle or worm drive according to claim 27 **characterised in that**
5 the gear elements (91, 92, 93, 94) are turned about at least 360° and are then held in this position and fixed.

29. Method for assembling a gear housing for the spindle
10 or worm drive according to claim 27 **characterised in that** the gear elements (91, 92, 93, 94) are driven at a speed which is above the nominal speed of the gear (9) and during rotation of the gear elements (91, 92, 93, 94) the position of the housing plates (72a, 72b, 77, 78) are
15 fixed relative to each other.

30. Method for assembling a gear housing for the spindle or worm drive according to claim 27 **characterised in that**
20 the fixing of the housing plates (72a, 72b, 77, 78) is produced by staking the material in the area of the plug-type connectors, but outside of the area of the bearing bores (74a, 74b) for the spindle nut (92).

25
31. Method for assembling a gear housing for the spindle or worm drive according to claim 27 **characterised in that** the fixing of the housing plates (72a, 72b, 77, 78) is undertaken by laser welding or by casting the plug-type
30 connectors.

32. Method for assembling a gear housing for the spindle or worm drive according to claim 27 **characterised in that**
35 the fixing of the housing plates (72, 72b, 77, 78) is carried out by sticking the plug-type connectors.

33. Method for assembling a gear housing for the spindle or worm drive according to claim 27 **characterised in that**

- 5 holding the outer contour of the housing plates (72a, 72b, 77, 78), turning the gear elements (91, 92, 93, 94) and staking the plug-type connectors are carried out in one combined assembly device.

10

34. Spindle drive for adjusting devices in motor vehicles wherein a threaded spindle (5) is tensioned rotationally secured between two holders (5a, 5b) at the ends, wherein the threaded spindle is associated with a spindle nut
15 mounted in a gear, **characterised in that** the threaded spindle (5) is fixed through at least one ideal break point in at least one holder (5a, 6b) and that at least one end of the threaded spindle (5) is formed as a positive locking element (66a) which can be connected to a
20 rotating tool in order to overcome the ideal break point for the purpose of an emergency operation of the drive.

35. Spindle drive according to claim 34 **characterised in**
25 **that** a threaded element (60) which has a groove (61) as a local material weakened area is welded to one of the holders (6a, 6b) and the threaded element (60) is squashed through this material weakening with the threaded spindle (5).

30

36. Spindle drive according to claim 34 **characterised in**
that the threaded element (60''') has on the side remote from the holder (6a, 6b) a distance sleeve (69) for
35 defining the travel path of the top rail (3) on the bottom rail (4).

37. Spindle drive according to claim 34 **characterised in that** for holding the threaded spindle (5) one of the
5 holders (6a, 6b) has a passage (62) which is squashed with the threaded spindle (5) at at least one place.

38. Spindle drive according to claim 34 **characterised in that** a threaded element (60) is welded to one of the
10 holders (6a, 6b) and this is associated with a counter nut (63) for fixing the position of the threaded spindle (5).

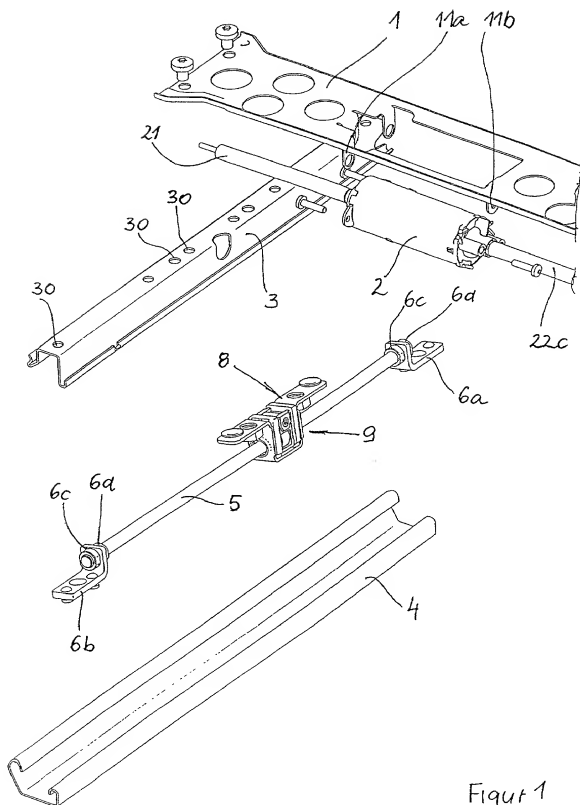
39. Spindle drive according to claim 34 **characterised in that** a nut (34) which is held secured against rotation in
15 positive locking engagement through a stop (6e) on one of the holders (6a, 6b) is welded to the threaded spindle (5) at at least one spot so that the welding spot (60a) is
20 formed as an ideal break point.

40. Spindle drive according to claim 34 **characterised in that** an anti-rotation lock preferably made of plastics
25 and mounted secured against rotation on the threaded spindle (5) is inserted with positive locking engagement into a threaded spindle receiving bore (65b) of a security plate (65) wherein the anti-rotation lock (66) is destroyed during emergency operation of the threaded
30 spindle (5).

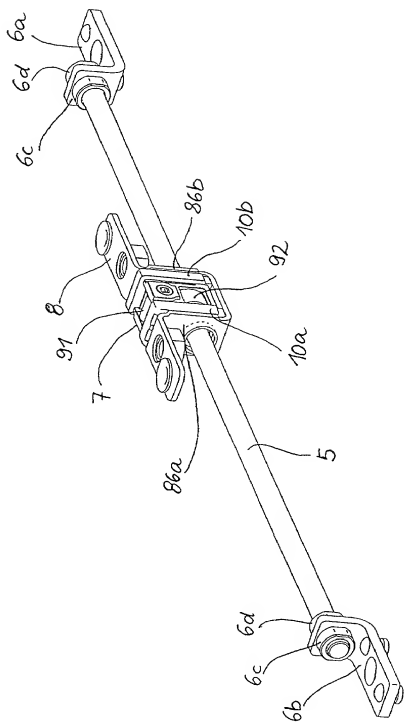
41. Spindle drive according to claim 34 **characterised in that** the security plate (65) fixes through a bracket (65a)
35 the position of a nut (64') which is mounted on the

threaded spindle (5) and secures the position of the threaded spindle (5).

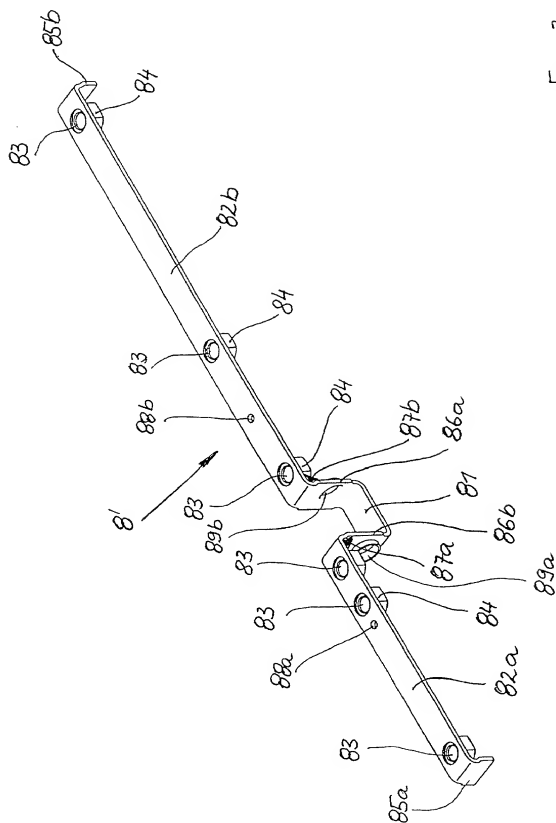
5 42. Spindle drive according to claim 34 **characterised in**
that a plastics security member (67a) is shaped in a
threaded spindle receiving opening (67) of both holders
(6a, 6b) so that the circular round cross-section of the
threaded spindle receiving openings (67) remains secure
10 and the width b of the plastics security member (67a) is
greater than the diameter d of the threaded spindle
receiving opening (67) wherein in the case of an emergency
operation the plastics security member (67a) can be
removed and the threaded spindle (5) can escape into the
15 space which becomes available.



Figur 1



Figur 2



Figur 3

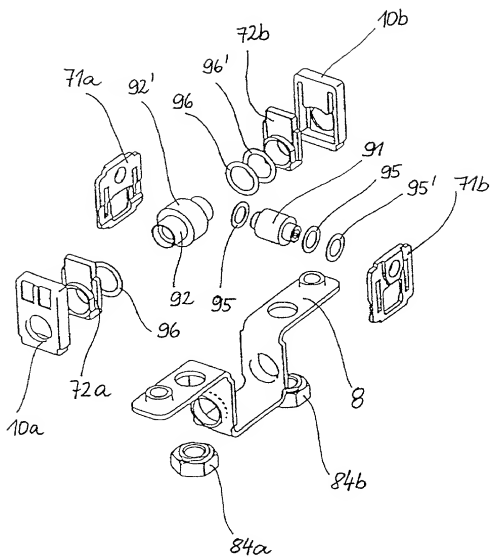


Figure 4

6/13

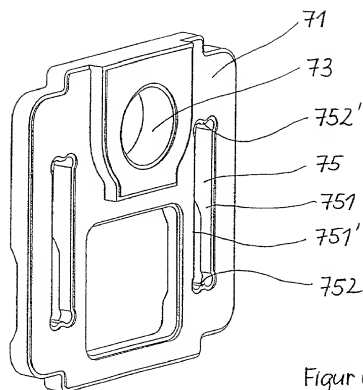


Figure 6

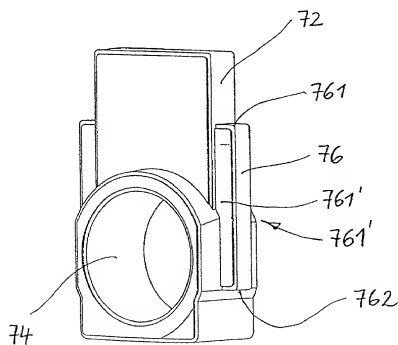


Figure 7

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7/13

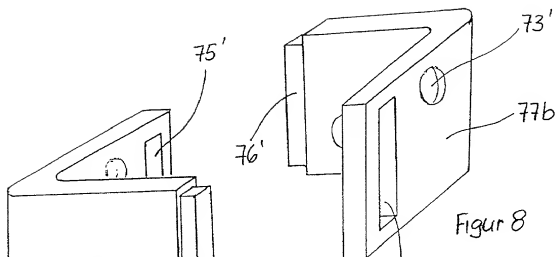


Figure 8

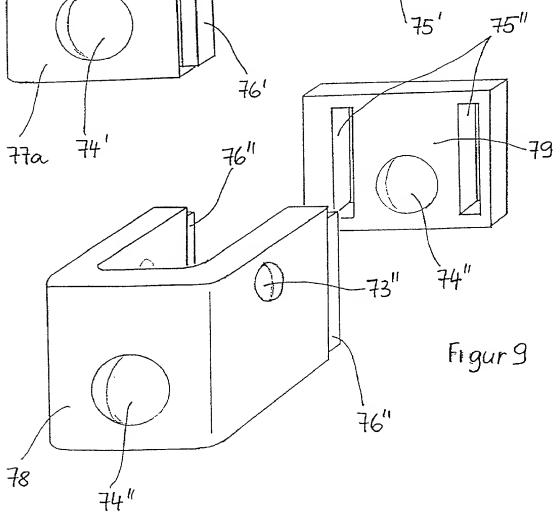
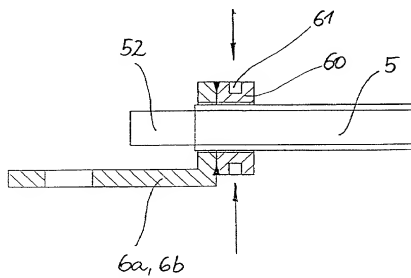
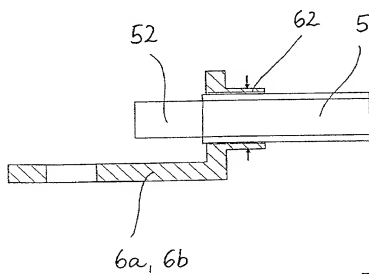


Figure 9

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Figur 10



Figur 11

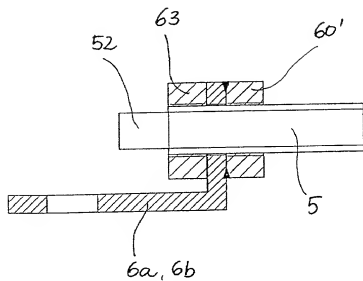


Figure 12

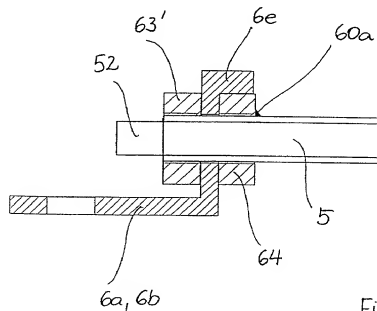
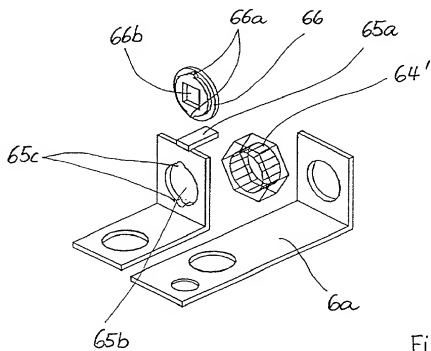
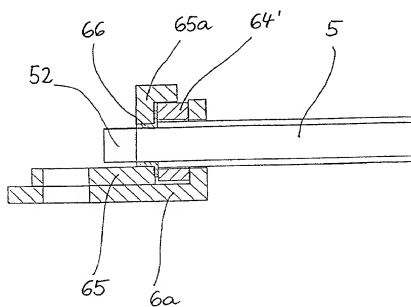


Figure 13

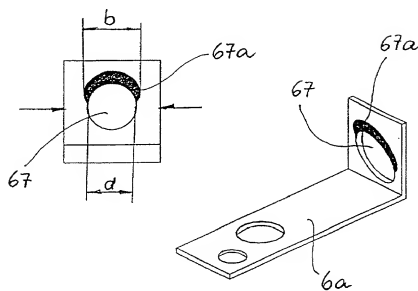


Figur 14

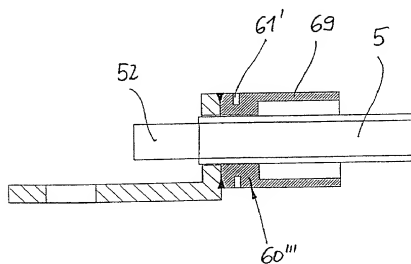


Figur 15

11/13

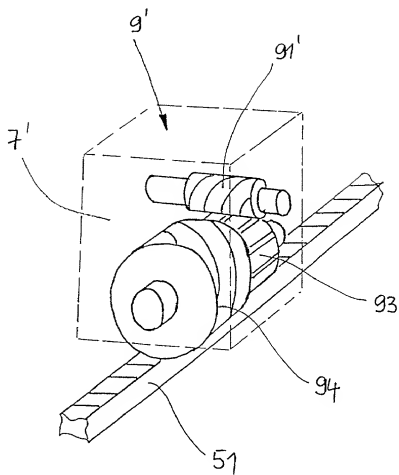


Figur 16

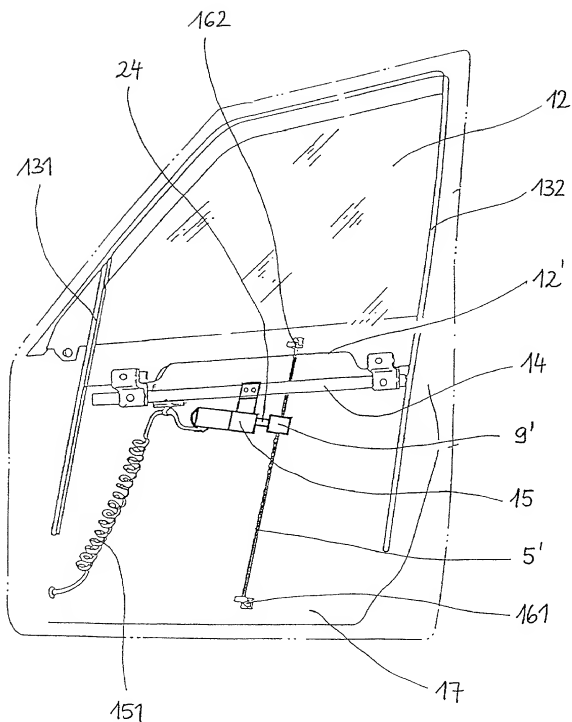


Figur 17

12/13



Figur 18



Figur 19

82055.642

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

PATENT

Docket No. : 40561/DBP/M521

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **SPINDLE OR WORM DRIVE FOR ADJUSTING DEVICES IN MOTOR VEHICLES**, the specification of which is attached hereto unless the following is checked:

X was filed on April 6, 1999 as United States Application Number or PCT International Application Number PCT/DE99/01082 and was amended on March 31, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of the foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

<u>Application Number</u>	<u>Country</u>	<u>Filing Date (day/month/year)</u>	<u>Priority Claimed</u>
198 15 283.3 ✓	Germany ✓	06 April 1998 ✓	YES

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

<u>Application Number</u>	<u>Filing Date</u>
---------------------------	--------------------

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

[illegible]

POWER OF ATTORNEY: I hereby appoint the following attorneys and agents of the law firm **CHRISTIE, PARKER & HALE, LLP** to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application;

0967-0609-12120

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

Docket No. 40551/DBP/M521

or from the first or sole inventor named below in the event the application is not assigned; or from MAIKOWSKI & NINNEMANN in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

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Walter G. Maxwell	(25,355)	Molly A. Holman	(40,022)	Derrick W. Reed	(40,138)
William P. Christie	(29,371)	Lucinda G. Auciello	(42,270)	John W. Peck	(44,284)
David A. Dillard	(30,831)	Norman E. Carte	(30,455)	Stephen D. Burbach	(40,285)
Thomas J. Daly	(32,213)	Joel A. Kauth	(41,886)	David B. Sandelands, Jr.	(46,023)
Vincent G. Gioia	(19,959)	Patrick Y. Ikehara	(42,681)	Heidi L. Eisenhut	(46,812)
Edward R. Schwartz	(31,135)	Mark Garcacia	(31,953)	Nicholas J. Pauley	(44,999)
John D. Carpenter	(34,134)	Gary J. Nelson	(44,257)	Mark J. Marcello	(36,593)
David A. Plumley	(37,208)	Raymond R. Tabandeh	(43,945)	Donald Bollella	(35,461)
Wesley W. Monroe	(39,778)	Cynthia A. Bonner	(44,548)		
Gregory S. Lampert	(35,584)	Jun-Young E. Jeon	(43,693)		

The authority under this Power of Attorney of each person named above shall automatically terminate and be revoked upon such person ceasing to be a member or associate or of or of counsel to that law firm.

DIRECT TELEPHONE CALLS TO : D. Bruce Prout, 626/795-9900

SEND CORRESPONDENCE TO : CHRISTIE, PARKER & HALE, LLP
P.O. Box 7088, Pasadena, CA 91109-7088

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor Werner Taubmann	Inventor's signature <i>Werner Taubmann</i>	Date 28-09-00
Residence and Post Office Address Lautertal, Germany <i>DEX</i>	Citizenship German	

Full name of second joint inventor Alwin Mach	Inventor's signature <i>Alwin Mach</i>	Date 6-10-00
Residence and Post Office Address Ebensfeld, Germany <i>DEX</i>	Citizenship German	

**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATIONS****Docket No. 40551/DBP/M521**

Full name of third joint inventor Bernhard Schrimpl	Inventor's signature <i>[Signature]</i>	Date 09.10.00
Residence and Post Office Address Coburg, Germany <i>DEX</i>		Citizenship German

Full name of fourth joint inventor Matthias Liebetrau	Inventor's signature	Date
Residence and Post Office Address Coburg, Germany		Citizenship German

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DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATIONS

PATENT

Docket No.: 40661/DBP/M521

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **SPINDLE OR WORM DRIVE FOR ADJUSTING DEVICES IN MOTOR VEHICLES**, the specification of which is attached hereto unless the following is checked:

X was filed on April 6, 1999 as United States Application Number or PCT International Application Number PCT/DE99/01082 and was amended on March 31, 2000 (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of the foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

<u>Application Number</u>	<u>Country</u>	<u>Filing Date (day/month/year)</u>	<u>Priority Claimed</u>
198 15 283.3	Germany	06 April 1998	YES

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

Application Number Filing Date

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

<u>Application Number</u>	<u>Filing Date</u>	<u>Patented/Pending/Abandoned</u>
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POWER OF ATTORNEY: I hereby appoint the following attorneys and agents of the law firm CHRISTIE, PARKER & HALE, LLP to prosecute this application and any international application under the Patent Cooperation Treaty based on it and to transact all business in the U.S. Patent and Trademark Office connected with either of them in accordance with instructions from the assignee of the entire interest in this application;

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATIONS

Docket No. 40561/DBP/M331

or from the first or sole inventor named below in the event the application is not assigned; or from MALKOWSKI & NINNEMANN in the event the power granted herein is for an application filed on behalf of a foreign attorney or agent.

R. W. Johnston (17,968)	Grant T. Langron (39,789)	Marc A. Karish (44,318)
D. Bruce Prout (20,058)	Constantine Marantidis (39,759)	John F. O'Rourke (38,965)
Raydon A. Carney (22,653)	Daniel R. Kimbell (34,849)	Richard J. Paculan (28,248)
Richard J. Ward, Jr. (24,187)	Craig A. Gelfound (41,032)	Josephine E. Chang (46,083)
Russell R. Palmer, Jr. (22,994)	Syed A. Hasan (41,057)	Frank L. Circ (42,419)
LeRoy T. Rahn (20,866)	Kathleen M. Olster (42,062)	Harold E. Wurst (22,153)
Richard D. Seibel (22,184)	Daniel M. Cavanagh (41,661)	Robert A. Green (28,381)
Walter G. Maxwell (25,355)	Molly A. Holman (40,082)	Derrick W. Read (40,188)
William F. Christie (29,371)	Lucinda G. Auciello (42,270)	John W. Peck (42,284)
David A. Dillard (30,881)	Norman E. Carte (30,455)	Stephen D. Burbach (40,285)
Thomas J. Daly (32,213)	Joel A. Kauth (41,886)	David B. Sandelands, Jr. (46,023)
Vincent G. Gioia (19,959)	Patrick Y. Ikehara (42,881)	Haidi L. Eichenhut (46,812)
Edward R. Schwartz (31,135)	Mark Garcia (31,953)	Nicholas J. Pauley (44,999)
John D. Carpenter (34,135)	Gary J. Nelson (44,257)	Mark J. Marcelli (36,588)
David A. Plumley (37,205)	Raymond R. Tabandeh (48,945)	Donald Bollella (35,461)
Wesley W. Moares (38,778)	Cynthia A. Bonner (44,648)	
Gregory S. Lompert (35,581)	Jun-Young E. Jeon (43,693)	

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DIRECT TELEPHONE CALLS TO : D. Bruce Prout, 626/795-9900

SEND CORRESPONDENCE TO : CHRISTIE, PARKER & HALE, LLP
P.O. Box 7068, Pasadena, CA 91109-7068

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor Werner Taubmann	Inventor's signature <i>Werner Taubmann</i>	Date 28-09-00
Residence and Post Office Address Lautertal, Germany		Citizenship German

Full name of second joint inventor Alwin Mach	Inventor's signature <i>Alwin Mach</i>	Date 6.10.00
Residence and Post Office Address Ebensfeld, Germany		Citizenship German

**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATIONS**

Docket No. 40551/DEP/M/621

Full name of third joint inventor Bernhard Schirmpf	Inventor's signature	Date
Residence and Post Office Address Coburg, Germany		Citizenship German

Full name of fourth joint inventor Matthias Liebetrau	Inventor's signature <i>M. Liebetrau</i>	Date 29.03.00
Residence and Post Office Address Coburg, Germany <i>HEX</i>		Citizenship German ✓

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